What is claimed is:

1) **A solid diamond electron emitter comprising a diamond greater than 5μ in thickness having a pointed surface with a radius of less than about 100μ.**

2) **The solid diamond electron emitter of claim 1 wherein said radius is less than about 10μ.**

3) **The solid diamond electron emitter of claim 2 wherein said radius ranges form about 3 angstroms to about 3μ.**

4) **The solid diamond electron emitter of claim 2 wherein said point has a surface roughness of between about 20 angstroms and about 10μ.**

5) **The solid diamond electron emitter of claim 2 wherein said point has a surface roughness below about 10 angstroms.**

6) **The solid diamond electron emitter of claim 1 wherein said point is produced using a non-contact machining technique.**

10

7) The solid diamond electron emitter of claim 4 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.

8) The solid diamond electron emitter of claim 5 wherein said radius is less than about 10μ.

9) The solid diamond electron emitter of claim 5 wherein said radius ranges form about 3 angstroms to about 3μ.

10) The solid diamond electron emitter of claim 1 further including a conductive shank to which said diamond is adhered.

11) The solid diamond electron emitter of claim 9 wherein said diamond is adhered to said conductive shank by a vapor deposited layer of palladium or titanium.

12) The solid diamond field emitter of claim 10 wherein said radius is less than about 10μ.

13) The solid diamond electron emitter of claim 10 wherein said radius ranges from about 3 angstroms to about 3μ.

14) The solid diamond electron field emitter of claim 9 wherein said point is produced using a non-contact machining technique.

15) The solid diamond electron emitter of claim 8 wherein said non-contact machining technique is selected from the group consisting of electron beam, ion beam and laser machining techniques.

16) A field emitter extractor gauge comprising a field emitter array, an anode grid, a focus plate, a reflector and a collector wherein said field emitter array comprises an array of solid diamond electron emitters each comprising a diamond greater than 5μ in thickness having a pointed surface with a radius of less than about 100μ.

17) A residual gas analyzer comprising a field emitter array, an anode grid, a focus plate and a quadrupole wherein said field emitter array comprises an array of solid diamond electron

emitters each comprising a diamond greater than 5μ in thickness having a pointed surface with a radius of less than about 100μ.

add B1

5 add B5